

**APPROVED** **SiGe LNA with Bypass Mode for LTE Low Band**

Description

MXD8921LG high gain, low noise amplifier (LNA) is dedicated to LTE low band receive using advanced SiGe process. This product has two operation modes, low noise mode and bypass mode.

MXD8921LG works under a 1.6V to 3.6V single power supply while consumes 5.5 mA current in low noise mode, in bypass mode, the power consumption will be reduced to less than 1uA. MXD8921LG uses a small 1.1mm×0.7mm×0.45mm LGA 6-pin package.

Applications

- LTE low band receiving

Features

- Broadband frequency range: 600M to 960MHz
- High Gain
- 18.5dB gain at 600MHz to 960MHz
- Ultra-low noise figure
- 0.75dB NF at 600MHz to 700MHz
- 0.65dB NF at 700MHz to 960MHz
- Operation current 5.5mA
- Small, LGA (6-pin, 1.1mm x 0.7mm x 0.45mm) package, MSL1
- No DC blocking capacitors required.

Pin Configuration/Application Diagram

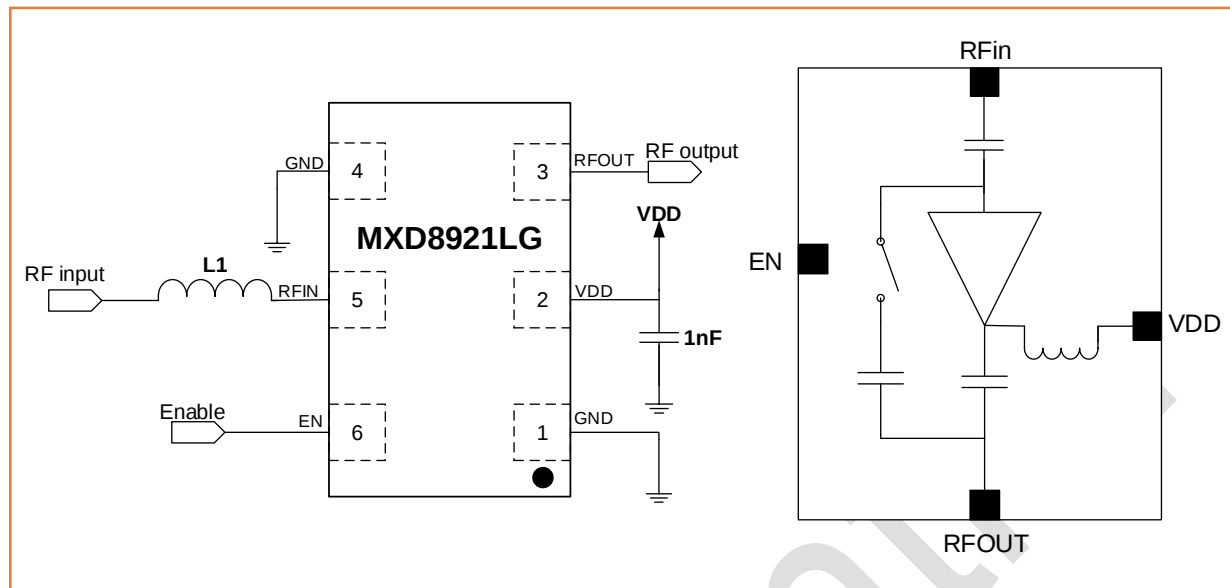


Figure 1 Pin Configuration/Application Diagram (Top View)

Table 1 Input matching inductance

Component	Matching Band	Vendor	Type	Part Number & value
L1	600MHz – 700MHz	Murata	Wired inductor, high Q	LQW15AN, 25nH
		various	Ceramic inductor, low Q	23nH
	700MHz – 960MHz	Murata	Wired inductor, high Q	LQW15AN, 15nH
		various	Ceramic inductor, low Q	14nH

Table 2 Pin Descriptions

Pin No.	Name	I/O	Pin Description
1	GND	AG	Analog VSS
2	VDD	AP	Power supply
3	RFOUT	AO	LNA output
4	GND	AG	Analog VSS
5	RFIN	AI	LNA input from antenna
6	EN	DI	Pull high into low noise mode, pull low into bypass mode

Note: DI (digital input), DO (digital output), DIO (digital bidirectional), AI (analog input), AO (analog output), AIO (analog bidirectional), AP (analog power), AG (analog ground),

Absolute Maximum Ratings

Table 3 Absolute Maximum Ratings

Parameters	Range	Units
Power supply	-0.3 ~ 4.0	V
Control Pin to GND	-0.3~VDD+0.3	V
maximum input RF power Note 2	25	dBm
Operation Temperature Range	-40~90	°C
Junction Temperature	150	°C
Storage temperature Range	-65~150	°C
Human Body Mode ESD	-2000~+2000	V
Charge Device Mode ESD	-1000~+1000	V
Machine Mode ESD	-100~+100	V

Note1: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

Note2: test CW frequency: 1800MHz.

DC Characteristics

Typically TA=25°C, All data measured on Maxscend's EVB, unless otherwise noted

Table 4 DC Characteristics

Parameters	Condition	Min	Typ	Max	Units
Operation Frequency	f ₁	600	-	960	MHz
Power supply	V _{DD}	1.6	1.8	3.6	V
Supply Current	High Gain, VDD=1.8V	4.0	5.5	7.0	mA
	High Gain, VDD=2.8V	4.2	5.7	7.2	mA
	Bypass mode	0	0.1	1.0	uA
Control Voltage High	V _{CTL_H}	1.0	1.8	VDD	V
Control Voltage Low	V _{CTL_L}	0	0	0.3	V

AC Characteristics

Typically TA=25°C V_{DD}=2.8V, All data measured on Maxscend's EVB, unless otherwise noted

Table 5 High Gain mode Electrical Specifications (V_{DD}=2.8V)

Parameters	Symbol	Min	Typ	Max	Units	Conditions
Power gain	G	16.5	18.5	20.5	dB	600 - 960MHz
Noise figure	NF	-	0.75	1.15	dB	600 - 700MHz
		-	0.65	1.05	dB	700 - 960MHz
Input Return loss	S ₁₁	-	-10	-5	dB	600 - 960MHz
Output Return loss	S ₂₂	-	-10	-5	dB	600 - 960MHz
Stability factor	Kf	1.2	-	-	-	-
Input 1 dB compression point	P _{1dB}	-12	-7.5	-	dBm	at 850MHz
Input IP3	I _{IP3}	-3	3	-	dBm	Note1
Turn on time	T _{on}	-	-	0.5	us	Note2
Turn off time	T _{off}	-	-	0.3	us	Note3

Note1: Pin=Pin2=-20dBm, F1=850MHz, F2=851MHz

Note2: Time from VEN ON, to 90% of the gain

Note3: Time from VEN OFF, to 10% of the gain

Table 6 Bypass mode Electrical Specifications (V_{DD}=2.8V)

Parameters	Symbol	Min	Typ	Max	Units	Condition
Insertion loss	IL	-9.0	-6.5	-	dB	600 - 700MHz
		-6.5	-4.0	-	dB	700 - 960MHz
Input Return loss	S ₁₁	-	-10	-5	dB	600 - 960MHz
Output Return loss	S ₂₂	-	-10	-5	dB	600 - 960MHz
Input 1 dB compression point	P _{1dB}	5	10	-	dBm	at 850MHz

Typically TA=25°C V_{DD}=1.8V, All data measured on Maxscend's EVB, unless otherwise noted

Table 7 High Gain mode Electrical Specifications (V_{DD}=1.8V)

Parameters	Symbol	Min	Typ	Max	Units	Conditions
Power gain	G	16.2	18.2	20.2	dB	600 - 960MHz
Noise figure	NF	-	0.75	1.15	dB	600 - 700MHz
		-	0.65	1.05	dB	700 - 960MHz
Input Return loss	S ₁₁	-	-10	-5	dB	600 - 960MHz
Output Return loss	S ₂₂	-	-10	-5	dB	600 - 960MHz
Stability factor	Kf	1.2	-	-	-	-
Input 1 dB compression point	P _{1dB}	-16	-11.5	-	dBm	at 850MHz
Input IP3	I _{IP3}	-6	0	-	dBm	Note1
Turn on time	T _{on}	-	-	0.5	us	Note2
Turn off time	T _{off}	-	-	0.3	us	Note3

Note1: Pin=Pin2=-20dBm, F1=850MHz, F2=851MHz

Note2: Time from VEN ON, to 90% of the gain

Note3: Time from VEN OFF, to 10% of the gain

Table 8 Bypass mode Electrical Specifications (V_{DD}=1.8V)

Parameters	Symbol	Min	Typ	Max	Units	Condition
Insertion loss	IL	-9.3	-6.8	-	dB	600 - 700MHz
		-6.8	-4.3	-	dB	700 - 960MHz
Input Return loss	S ₁₁	-	-10	-5	dB	600 - 960MHz
Output Return loss	S ₂₂	-	-10	-5	dB	600 - 960MHz
Input 1 dB compression point	P _{1dB}	4	9	-	dBm	at 850MHz

Package Outline Dimensions

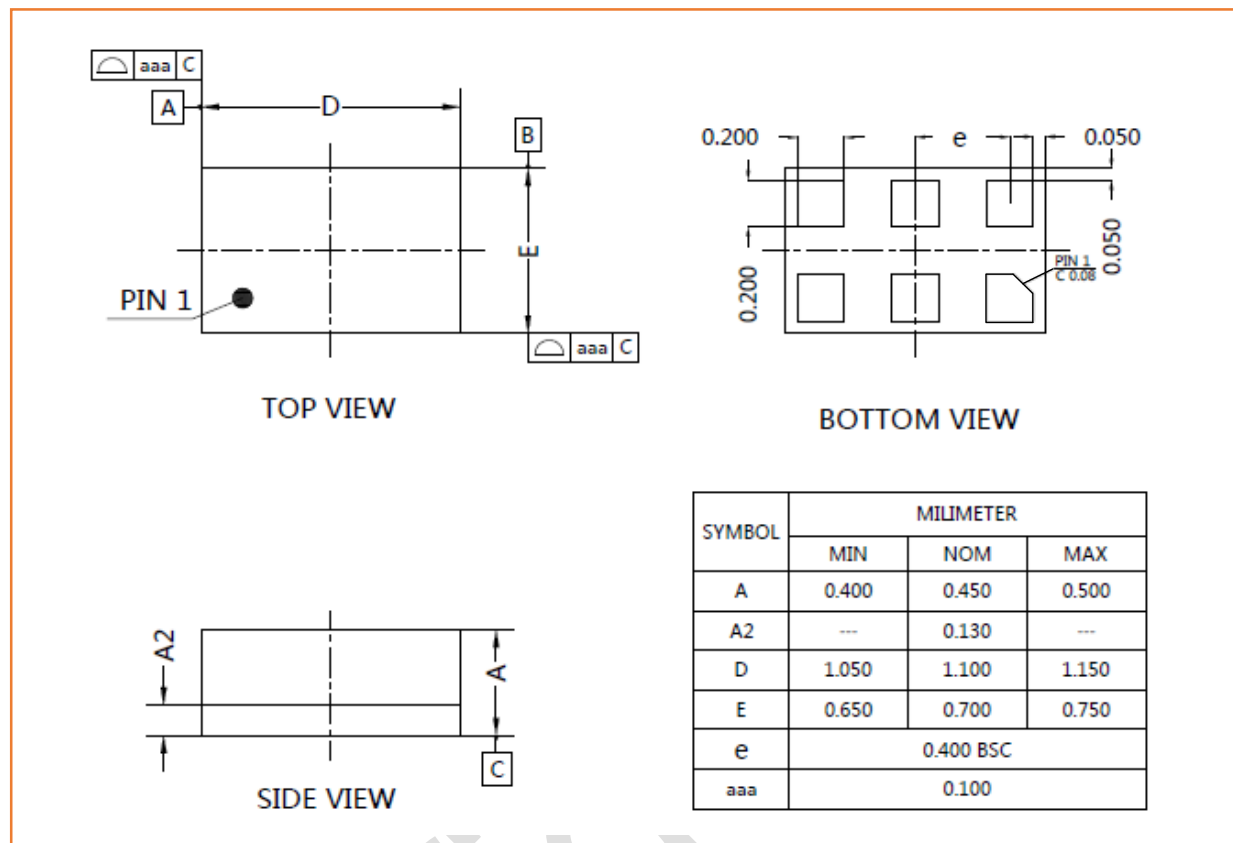


Figure 2 Package Outline Dimensions

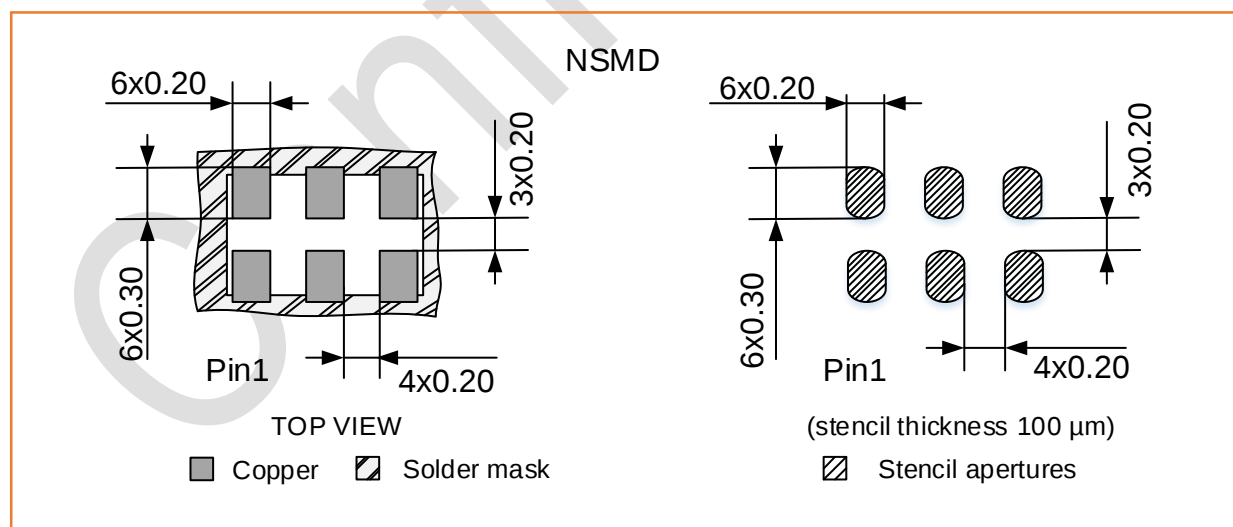


Figure 3 PCB Layout Footprint

Note: All dimensions are in millimeters. The footprint is only for reference, and the specific application is subject to the actual situation.

Marking Specifications

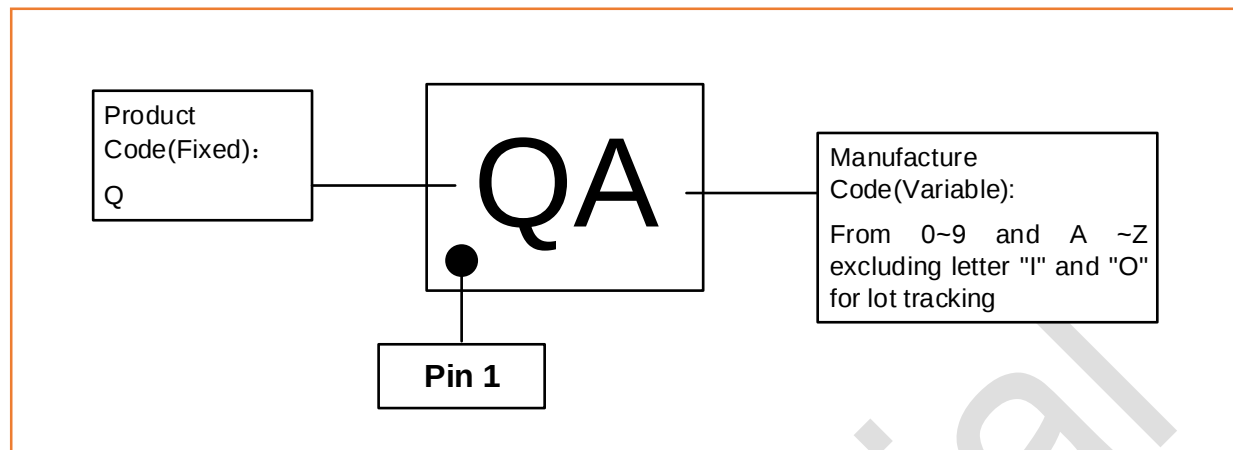


Figure 4 Marking Specification (Top View)

Tape and Reel Dimensions

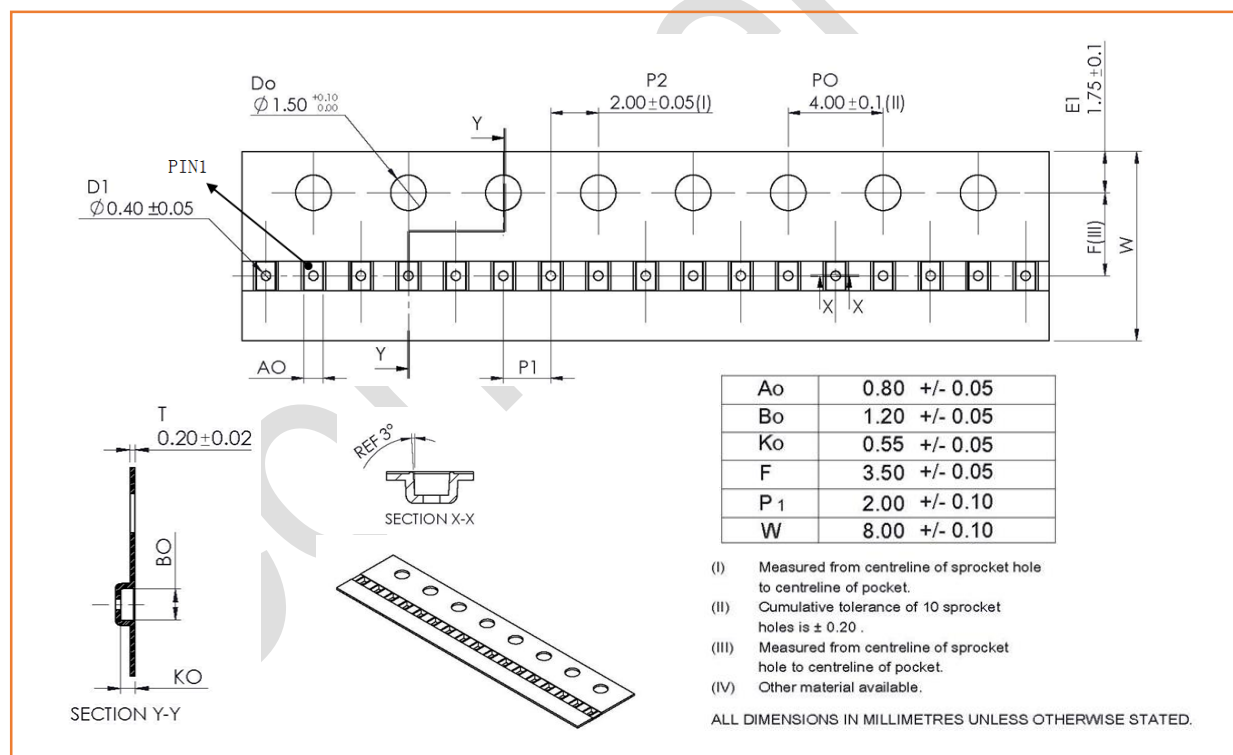


Figure 5 Tape and Reel Dimensions

Reflow Chart

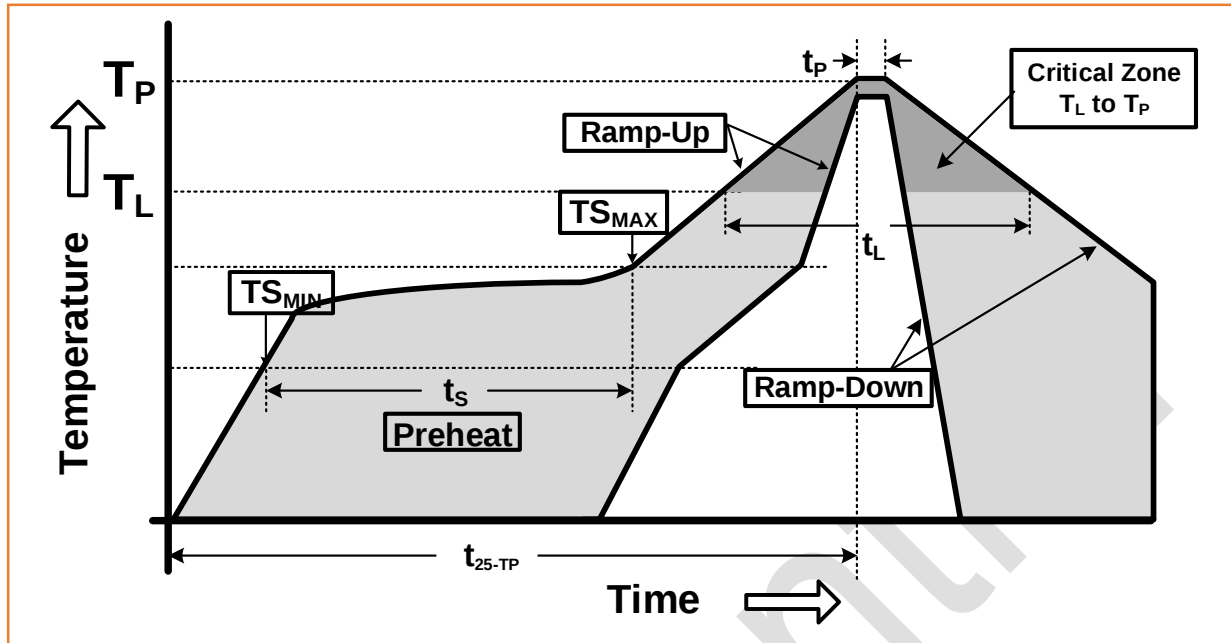


Figure 6 Recommended Lead-Free Reflow Profile

Table 9 Reflow Chart Parameters

Reflow Profile	Parameter
Preheat Temperature(T_{S_MIN} to T_{S_MAX})	150°C to 200°C
Preheat Time(t_S)	60 to 180 Seconds
Ramp-Up Rate(T_{S_MAX} to T_P)	3°C/s MAX
Time Above T_L 217°C(t_L)	60 to 150 Seconds
Peak Temperature (T_P)	260°C
Time within 5°C of Peak Temperature(t_P)	20 to 40 Seconds
Ramp-Down Rate(T_{S_MAX} to T_P)	6°C/s MAX
Time for 25°C to Peak Temperature(t_{25-TP})	8 Minutes MAX

ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electric charge. Proper ESD protection techniques should be applied when devices are operated.

RoHS Compliant

This product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), and are considered RoHS compliant.